Nutrition and Health: What do Year 6 children know, understand, and believe? A pilot study

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Abstract

Background: Childhood obesity is a worldwide problem and a well-known cause of this is nutrition, in the form of an unhealthy diet, combined with a lack of physical activity. Whilst consuming a nutritious diet can benefit obesity outcomes, there are additional benefits of consuming nutritious foods for health that need to be recognised. Nutrition can affect growth and development, bone health, brain development, mental health, disease and illness, and sleep. Educating children on the far-ranging effects of food may enhance nutrition behaviour, whilst promoting a positive relationship with food. Before we can educate children, it is essential that we gain an insight into what New Zealand children currently know about the effect of food on health, as little research has been undertaken in this area.

Objective: The purpose of this pilot study was to trial methodology that could ascertain what 9-11-year old children in New Zealand currently know, understand and believe about the effect of food on their health.

Design: This qualitative study recruited Year 6 children from a range of schools within the West and South Auckland regions of New Zealand. Researchers conducted one or two focus groups in each school during which children were asked questions relating to health, being healthy and the effect of food on health. All focus groups were transcribed and analysed using Nvivo12 software and thematic analysis was undertaken to identify main themes and sub themes.

Results: In total 11 focus groups including 74 children participated in this study, from three schools in West Auckland and three schools in South Auckland (deciles ranged from 2 to 8). Children consistently identified being physically active, eating fruits and vegetables and eating a balanced diet as important components of being healthy. After

conducting thematic analysis, four main themes were generated regarding the effect of food on health. These were; growth and development; protecting from disease and illness; providing energy; and learning at school. This study also identified common misconceptions of children about energy and protein containing foods.

Conclusion: Findings from this pilot study indicate that focus groups are a feasible method to ascertain what year 6 children in New Zealand know, understand and believe about the effect of food on health. Future research should focus on these common misconceptions the children have and investigate the influences in children's lives causing these misconceptions.

Preface

Amy McLachlan (student researcher) completed this thesis as part of her Master of Dietetics degree, alongside fellow Master of Dietetics student Isabel Carlisle, under the supervision of Professor Murray Skeaff and Associate Professor Sheila Skeaff. Professor Murray Skeaff initiated this research project and assisted with the study design and ethics proposal. Associate Professor Sheila Skeaff was the primary supervisor and responsible for providing guidance and recommendations throughout the research process and providing feedback during the editing stage of this thesis.

This project began on 4th September 2017 for six weeks and re-commenced on the 1st of February 2018 for 21 weeks. Throughout this period, student researchers had weekly zoom meetings with supervisor(s) to discuss progress. This project was funded by the University of Otago Human Nutrition Department.

The student researcher, Amy McLachlan was responsible for the following in collaboration with the fellow student researcher:

- Contributed to the design of the pilot study including methodology, focus groups (i.e. size and duration) and creating a focus group plan based on recommendations from the literature and consultation with supervisors
- Designing and finalising questions for focus group discussions based on the literature
- Completing a draft University of Otago ethics application
- Recruiting primary schools in West and South Auckland
- Communicating with school teachers and principals, delivering information packs to schools and organising dates for focus groups to take place
- Preparing gift packs, certificates and food for focus group participants

- Facilitating and recording focus group discussions
- Transcribing focus groups from all West Auckland and South Auckland schools
- Cross marking transcriptions with fellow student researcher
- Conducting thematic analysis using Nvivo12 Qualitative software to generate themes and sub themes
- Writing and completing this thesis

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Table of Contents

Abstract ..... **ii**

Preface ..... **iv**

Acknowledgements ..... **vi**

Table of Contents ..... **vii**

List of Tables ..... **x**

List of Figures ..... **xi**

List of Abbreviations ..... **xii**

1. Introduction **1**

2. Literature Review **3**

2.1 Health 3

2.2 Nutrition and health 4

2.3 Nutrition and health in children 5

2.3.1 Growth 5

2.3.2 Bone health 5

2.3.3 Brain development and academic performance 6

2.4 What do children know about nutrition and health? 6

2.4.1 Children's knowledge of health 6

2.4.2 Children's knowledge of the role of nutrition in health 7

2.5 Qualitative methods to assess knowledge in children 9

2.5.1 Interviews 12

2.5.2 Focus groups 12

2.6 Conclusion 15

3. Objective Statement **16**

4. Subjects and Methods **17**

4.1 Study design 17
4.2 Participants and recruitment 17
4.3 Data collection 19
4.3.1 Focus groups 19
4.3.2 Development of questions 20
4.3.3 Structure of focus groups 21
4.4 Data analysis 22
4.4.1 Thematic analysis 22
5. Results 24
5.1 Participants 24
5.2 Focus group results 25
5.3 Health 26
5.4 Being healthy 27
5.5 Summary of findings 29
5.6 Major themes: The effects of food on health 29
5.6.1 Theme 1: Growth and Development 29
5.6.1.1 Sub-theme: Bone health 29
5.6.1.2 Sub- theme: Being strong 30
5.6.1.3 Sub- theme: Growth 30
5.6.2 Theme 2: Disease and illness 31
5.6.2.1 Sub-theme: Getting sick 31
5.6.2.2 Sub- theme: Diabetes 32
5.6.3 Theme 3: Energy 32
5.6.4 Theme 4: Learning at school 33
6. Discussion 35
6.1 Health 35
6.2 Nutrition and health 35

6.3 Feasibility and recommendations for future research 39
6.4 Strengths and limitations 40
6.4.1 Strengths 40
6.4.2 Limitations 41
6.5 Conclusion 41
7. Application of Research to Dietetic Practice 42
7.1 Part A 42
7.2 Part B 43
8. References 44
9. Appendices 51
Appendix A: Ethics Approval 52
Appendix B: Letter to principal 54
Appendix C: Information sheet for parents/guardians 56
Appendix D: Consent form for parents/guardians 59
Appendix E: Information sheet for children 61
Appendix F: Consent form for children 63
Appendix G: Demographic questionnaire for children 64
Appendix H: Development of focus group questions 66
Appendix I: Focus group script 67
Appendix J: Supporting quotations for main themes 68

List of Tables

Table 1: Qualitative methods used in research with children 10

Table 2: Participant characteristics 25

List of Figures

Figure 1. Flow chart for the school recruitment process.....18

List of Abbreviations

WHO	World Health Organization
USA	United States of America
UK	United Kingdom

1. Introduction

Health is a multi-dimensional concept and can have different meanings for individuals of different ages, cultures and backgrounds (1). Health is defined by the World Health Organization (WHO) as "*a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*" (2). Health can be affected by multiple factors such as socioeconomic status, living and working conditions, cultural values, environment, society, and lifestyle including nutrition (3, 4).

Perhaps the most well-known effect of nutrition on health is the relationship between food and obesity (5-7). Childhood obesity is a serious problem around the world, including in New Zealand, and the 2016/17 New Zealand Health survey found that of children between the ages of 2-14 years, 12% were obese and an additional 21% of children were overweight (8). Consuming a nutritious diet can be beneficial for childhood obesity, but food can also affect other important aspects of health. For example, optimal nutrition in childhood can benefit growth, including bone health and brain development (9-11). Little is known about children's understanding of the role of food and nutrition for health, as defined by WHO.

To date, research has assessed children's understanding of food as *'healthy'* and *'unhealthy'* or *'good'* and *'bad'*, particularly as this relates to body weight and obesity (12-15). The limitation of this approach is that it does not measure what children know about the role of food in promoting health. There is limited research that has focused on children's understanding of the effect of food on the broader aspects of health. The few existing studies report that children understand that nutritious food and physical activity are important components of physical health including having an ideal body weight (16-18). However, children's understanding about the effect of food on other aspects of life such as mental

health and well-being, brain development and learning, sleep and physical activity, and disease is unclear.

Educating children about the broader health benefits of food will have a beneficial effect on nutrition behaviour and consequently health, that will track into adulthood. In order to develop an educational curriculum that includes a food and nutrition component, it is necessary to investigate what children actually believe about food and nutrition, and to identify any knowledge gaps. The purpose of this pilot study was to trial methodology that could ascertain what New Zealand school children currently know, understand and believe about the effect of food on their health.

2. Literature Review

This literature review consists of three sections. In the first section, literature about health, including the definitions of health, and the role of nutrition in health, particularly for children, is presented. The second section critically reviews the literature examining children's knowledge of health and the relationship between nutrition and health. The third and final section evaluates the qualitative methods including interviews and/or focus groups used in this research.

Literature searches were conducted in October 2017 and throughout February to June 2018 using the databases PubMed, Google Scholar and Scopus. Search terms included *'food'*, *'health'*, *'school children'*, *'health knowledge'*, *'nutrition'*, *'qualitative*', *'focus groups'* alone and in combinations. Inclusion criteria was as follows: papers available in full text, published in English, and relevant to the field of nutrition and health. Reference lists from key studies were also used.

2.1 Health

The global definition of health that currently exists was developed in 1948 by the WHO and defines health as "*a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*" (2). In New Zealand, Māori populations particularly, have a similar view of health and recognise health to consist of four domains: te taha wairua, te taha hinengaro, te taha tinana and te taha whanau to represent spiritual, emotional, physical and family health, respectively (19, 20).

The definition of health often varies between populations, but there is a general consensus that health is a multi-dimensional concept and encompasses more than just the physical aspects of health such as body weight. Health is affected by multiple factors, with the main

determinants of health being socioeconomic status, cultural values, environment, living and working conditions, society and individual factors, including nutrition (3, 4).

2.2 Nutrition and health

A well-established association between nutrition and health is that poor nutrition, in the form of an unhealthy diet, can lead to obesity (6, 7, 21, 22). However, obesity is complex and factors other than nutrition including genetics, socioeconomic status, environment, food marketing and political factors are associated with obesity (5-7, 21). Because these factors are difficult for individuals to control, nutrition has become a major focus of obesity prevention strategies. In addition to obesity, consuming an energy dense diet, high in saturated fats, combined with a lack of physical activity has also been shown to increase the risk of cancer, cardiovascular disease, type 2 diabetes mellitus, and overall mortality and disability (23, 24).

As well as influencing obesity and disease outcomes, research reports that there is an association between nutrition and mental health. A recent meta-analysis published by Li et al. suggests that eating a less healthy diet compared with eating a healthy diet (i.e. high in fruits, vegetables, wholegrains, oil, fish, soy, poultry and low fat dairy foods) is associated with a higher risk of depression (25). This study is supported by findings from other systematic reviews and meta-analyses (26, 27). A systematic review focussing on the effect of diet on mental health in participants aged 4-18 years also noted an association between an unhealthy diet and poorer mental health outcomes (i.e. depression, mood and anxiety) (28), however more evidence is needed to confirm this association.

Sleep is another important aspect of health that can be affected by nutrition. In a cross-sectional study of young females in Iran, diet quality was scored and compared with self-reported sleep duration (29). Participants who slept the longest were found to have a significantly lower energy intake than participants who slept less than five to six hours,

consistent with other research conducted in both males and females (30, 31). Additionally, findings showed participants that slept longer had higher intakes of protein, fibre, fruit, whole grains, beans, vitamin C and vitamin B12 compared with those who slept less (29). Research conducted by Katagiri et al. in 3129 females aged 34-65 years in Japan produced similar findings (32). Furthermore, a study by Zadeh et al. showed that normal sleepers, compared to insomniacs, consumed significantly higher intakes of energy, folic acid and vitamin B12 (33).

2.3 Nutrition and health in children

2.3.1 Growth

Nutrition has many effects on health for children including the promotion of normal growth and development. Optimal nutrition is essential throughout childhood as sufficient energy and nutrients are required for growth (9). Growth is used to assess nutritional status in children, for example, weight-for-height and height-for-age are used to identify impaired growth (34-36) which can be indicative of a macronutrient (e.g. protein) or micronutrient (e.g. zinc, iron, vitamin A) deficiency (37, 38).

2.3.2 Bone health

Growth and the acquisition of bone mass is critical throughout childhood and 90% of peak bone mass is obtained by 18 years of age (39). Dietary calcium plays an essential role in acquiring bone, with vitamin D, to assist with the absorption of calcium from the diet (39, 40). Childhood is therefore a vulnerable time and optimal nutrition is needed to ensure calcium requirements are met (41). A report by Greer et al. conducted in children from the United States of America (USA), showed that a high proportion of children were not consuming the recommended amount of calcium per day; an inadequate calcium intake in childhood and adolescence can result in weaker bones, leading to an increased risk of fractures and osteoporosis later in life (11).

2.3.3 Brain development and academic performance

Brain development occurs throughout childhood and is a complex process requiring a variety of macro and micronutrients (10), and there is consensus that adequate nutrition is essential for brain growth. In contrast, the role of nutrition on cognition, including school performance, is inconsistent. Research conducted by Florence et al. in Canada investigated the effect of food on school performance in 4589 children aged 10-11 years and concluded that consuming a varied diet, containing fruits and vegetables, resulted in improved scores on their academic tests (i.e. Elementary Literacy Assessment) (42). Similarly, Burrows et al. found that eating a diet that includes breakfast and fruits and vegetables every day, increased scores on writing tests of Australian children aged 8-15 years (43). In contrast, a randomised, controlled, cross-over study in Denmark provided 8-11-year-old school children with lunch and snacks throughout the day, based on Nordic nutrient recommendations. Increased scores in reading tests, but no significant improvements in concentration, and an increased number of mistakes in the test was found, suggesting that groups who received the school meals had higher levels of distraction and impulsivity compared to the control group (44).

2.4 What do children know about nutrition and health?

2.4.1 Children's knowledge of health

There is limited research investigating what primary school children believe about health. In 1978, Natapoff et al. asked 264 children from the USA aged six years, nine years and 12 years old to describe health. Children thought health was *"feeling good, being able to do wanted things, not being sick, and eating foods"* (45). These findings are similar to a 2009 study by Reeve et al., who interviewed 13 children about their understandings of health; children believed that health meant being able to participate in activities and being free from disease (46).

A project conducted in 1998 in 2880 New Zealand school children (i.e. National Education Monitoring Project), aged 8-9 years and 12-13 years explored what they thought about being healthy (17). Children stated that to become healthy it was important to eat the right foods, drink water, be active, get enough sleep, socialise and stay clean (17). Children thought that the benefits of doing these healthy behaviours would result in them having more energy, running faster, feeling and looking good, being happy and not being fat (17). Using data from the same project, another paper noted that when children referred to health, younger children mentioned images they had seen on television, such as advertised weight loss products and parental behaviours involving scales and gyms (47); it was common for children to focus on appearance and make multiple references to body weight. Similar findings were reported by Dixey et al. where children aged 9-11 years mentioned body size and its associated social pressures (48). Together, these findings highlight children's awareness of the physical aspects of health, and the large influence that television, the beliefs of parents, and classmates have on children's knowledge and beliefs.

2.4.2 Children's knowledge of the role of nutrition in health

To date, several studies investigating food and health in children have focussed on children classifying foods using the terms *'good'* and *'bad'* or *'healthy'* and *'unhealthy'* (12-15). Researchers have used a variety of methods to conduct this research. Some studies have children look at pictures of foods and ask them to make *'healthy'* and *'unhealthy'* pairs by pairing foods together that contain the same number of calories, or, in other studies, using ticks and crosses to indicate foods that are *'good'* or *'bad'* (12, 14, 15). Some children found this approach confusing for some foods. For example, children knew that french fries were made from potato, and potatoes are *"healthy"*, but children were not certain if french fries were healthy (15, 49). A similar example was fried chicken; chicken was considered

"*healthy"* with only 48% of children stating that fried chicken was an "*unhealthy"* option (14).

Studies investigating children's understanding of nutrition and health had some consistent findings. A common view held by children was that eating fruits and vegetables was an important part of a healthy diet (14, 16, 50-56). Another common belief of children was that a balanced diet was an important factor in being healthy, with a balanced diet containing mostly *"healthy"* foods but sometimes *"unhealthy"* foods (18, 50, 51, 53, 56-58). Many studies also reported that children thought that eating too many *"fattening*" foods was *"bad"* and would lead to weight gain (13, 50, 54, 57, 58).

The previously mentioned studies focussed on children's classification of *'healthy'* and *'unhealthy'* foods and a simple understanding about what types of food constitute a healthy diet. The remainder of this section discusses the limited studies that have investigated children's views about how food, and its components, affect health. Hart et al. asked primary school children aged 7-11 years from the United Kingdom (UK) *"what are good or bad foods?"* and to explain their reasoning (13). The study found that children were familiar with the effect of food on tooth decay, which was also reported in other studies (16, 57). A UK study of children aged 4-5 years found that they were aware that food can make you grow and become strong (18) and in another UK study, children aged 6-11 years stated that food gave you strength but did not mention that food can affect growth (57).

A qualitative study based in Australia asked children aged 7-17 years to state the advantages of eating healthy food (59). The study reported that children thought the most important benefits of healthy food were increased cognitive performance, feeling good physically, psychological improvements such as increased self-esteem, and having more energy (59). These findings of this study reflect a more advanced view compared to research previously

discussed and one possible explanation for this difference is the inclusion of older children, who may have a deeper understanding of the effect of food on health.

In a New Zealand based study, Banville et al. conducted focus groups in two different schools to understand children's views on physical activity and being healthy (16). Altogether there were 50 children aged 9-10 years participating in small focus groups. Questions mainly focussed on physical activity and discussions showed that children knew there was a relationship between eating healthy, physical activity and improving brain activity. However, when asked to further explain these relationships, children struggled to provide valid answers (16).

2.5 Qualitative methods to assess knowledge in children

Qualitative methods provide an *"in depth"* insight into what study participants understand about a topic (60). Focus groups and interviews are the most frequently used qualitative methods, particularly when research is focussed on health (61). **Table 1** outlines the different techniques researchers have used in qualitative studies undertaken in children

Table 1: Qualitative methods used in research with children

Year	First Author	Title	Participants	Methods
2018 (50)	Velardo	Australian children's perceptions of discretionary foods	38 children aged 11-12 years from South Australia	Children could participate in a focus group or one-on-one interview. Focus groups contained four children and were single sex. Questions about what nutrition is and the importance of it.
2017 (16)	Banville	Feeling refreshed: Aotearoa/New Zealand students' perspectives of the role of healthy behaviours in schools	50 children aged 9-10 years from two North Island primary schools in New Zealand	Focus group interviews with two to three children asking questions about physical activity and being healthy.
2011 (18)	Fielden	Children's understandings of obesity, a thematic analysis	Six children aged 4-5 years and six children aged 10-11 years attending a school in North East England	Focus groups with three children in each group. Single sex groups. Questions focussed on what children thought about diet and exercise, advantages of a healthy lifestyle and the importance of being healthy.
2010 (62)	Slaughter	Development of ideas about food and nutrition from preschool to university	100 participants from a variety of age groups ranging from 5-20 years. 20 children from grade 3 (8 years old) and 21 children from grade 6 (11 years old) in Australia.	One-on-one interviews with questions about the effect of food, why we eat, an unbalanced diet, and portions of foods.
2009 (46)	Reeve	Children's self-documentation and understanding of the concepts 'healthy' and 'unhealthy'	13 children in the age range of 9-11 years in America	Children were asked to take pictures on a camera of unhealthy and healthy foods and write in a notebook. Researchers also interviewed children and asked further questions

2008 (53)	Gosling	"If Michael- Owens drinks it, why can't I?" 9 and 10-year olds' perceptions of physical activity and healthy eating	32 children aged 9-10 years old from two primary schools in England	Focus groups consisted of a maximum of eight children and were single sex groups. Focus groups lasted for about an hour.
2006 (57)	Stewart	Understandings about food among 6-11-year olds in South Wales	74 children aged 6-11 years from four schools in Cardiff	One-on-one interviews asking questions about food preferences, understanding of food and drink, and what information they learn from others
2005 (49)	Hesketh	Healthy eating, activity and obesity prevention: a qualitative study of parent and child perceptions in Australia	119 children from age groups; 7-8 years and 10-11years from primary schools in Australia	Focus groups of three to six children. Questions included photographs of healthy and unhealthy foods, activities and pictures of overweight people.
2002 (13)	Hart	An investigation into school children's knowledge and awareness of food and nutrition	114 children aged 7-11 years from primary schools in Surrey.	Focus groups consisting of five children, single sex and age grouped. Questions based on parents' rules and good and bad foods.
2001 (48)	Dixey	Children talking about healthy eating: data from focus groups with 300 9–11-year-olds	300 children aged 9-11 years from 10 primary schools in Leeds	Focus groups with five children in each group. Single sex groups. Questions focussed on being healthy and body size.
1997 (63)	Lytle	Children's interpretation of nutrition messages	141 children from grades K-6 in Minnesota (5-12 years)	15 individual interviews and 10 focus groups of between two to nine children in each group. Questions asked about variety, weight, dietary guidelines, food labels and food identification.

2.5.1 Interviews

One-on-one interviews are discussions shared between two people where an interviewee is asked questions by an interviewer about a certain topic. Interviews can be structured, semi-structured or unstructured (64). One-on-one interviews were used in some studies to investigate what children know about nutrition (46, 50, 57, 62, 63). Slaughter et al. conducted interviews in a study of 100 children and adolescents in Australia. Participants in this study were from five different age groups ranging from 5-20 years and researchers asked individual participants 13 pre-determined questions about the reasons for eating, serving sizes and the effects of food (62). A limitation of this study is the high burden it placed on the participants in a one-on-one setting. An advantage of one-on-one interviews is that children may feel more comfortable expressing their thoughts and will not be influenced by the views of other children, making this a valuable method when the research topic is sensitive (61).

2.5.2 Focus groups

Focus groups have been defined in the literature to be "*a carefully planned discussion to obtain perceptions on a defined area of interest in a permissive, non-threatening environment*" (65). Due to the nature of focus groups, they are considered an effective method for research in children that is trying to gain insights into their thoughts and opinions on health-related topics (66-68). A number of studies have used focus groups to determine children's understanding of food and nutrition (13, 16, 18, 48-50, 53, 63). The literature suggests that the ideal number of children in focus groups is four to six (13, 48, 50, 66, 68-70). Small groups are advantageous for children as the small number provides a better opportunity for children to voice their opinions. The length of focus groups in school children varies widely but recommendations range from 20-

60 minutes (13, 18, 49, 53, 66). Studies using focus groups of children were either single sex (13, 18, 48, 50, 53) or contained boys and girls (16, 49, 63). Some authors argue that in children aged 9-11 years old, beliefs may differ between boys and girls, so it is important to separate them (69). However, a review by Heary et al. showed that although single sex focus groups were beneficial for younger children, in the age group of 9-11 years, focus groups containing boys and girls are acceptable (66). Lytle et al. detected no differences in answers from boys and girls in any age group, including children aged 10-11 years (63), suggesting that separating boys and girls is not necessary, particularly if the topic is of a general nature.

Focus groups, particularly with children, need to be designed at an appropriate level and questions need to be clear to avoid confusion or misinterpretation (53, 69, 71). The number of questions in focus groups with children varies throughout the literature and ranges from 5-15 questions (16, 48, 50), depending on the duration of the focus group and the number of children. The literature recommends that the order of questions should be considered and that the first questions asked should be general moving to more specific questions as the discussion progresses (61, 72). Previous studies conducted in children investigating their understandings of nutrition and healthy behaviours have included questions focussed on physical activity, the advantages of being healthy, body size, parental rules about food, food groups, food labelling and favourite foods (13, 16, 18, 48, 50, 63).

A potential limitation in some focus groups is an untrained facilitator. The facilitator needs to remain neutral throughout discussions and should not direct the conversation in a certain direction (61, 68, 71-73). Because children may feel uncomfortable to talk in a focus group in fear of being wrong, it is vital that the facilitator builds rapport and

makes the children aware that there are no right or wrong answers. Creating a safe environment will improve the quality of data collected. Conducting focus groups in environments that children are familiar with, such as areas within their school, may create an additional feeling of ease (53, 71).

Both Velardo et al. and Lytle et al. used a combination of focus groups and individual interviews to collect data about children's perceptions of nutrition and nutrition messages (50, 63). Lytle et al. asked children questions about their understanding of nutrition messages including nutrition recommendations and reading food labels and children were randomly assigned either an interview or focus group discussion (63). Conversely Velardo et al. asked questions on the meaning of nutrition and where children learnt this information from. Children could choose whether they preferred to partake in a focus group or interview, resulting in 24 children participating in focus groups and 14 participating in interviews (50). In both studies, findings from focus groups and interviews were combined and Lytle et al. noticed similar findings from focus groups and interviews. Using a combination of methods is advantageous, however does require more organisation and can be time consuming.

An interesting study was conducted in Ireland in 116 children aged 8-14 years (70). Children were randomly assigned into either a focus group or one-on-one interview and were asked the same questions regarding psychological issues. Although not relevant to the current study, following these questions children were asked three questions about their experience of participating in the research in terms of enjoyment, opportunity to speak and if they thought it was an effective way to talk to children their age. Children answered these questions by rating on a scale. Findings showed that children enjoyed taking part in both research methods and no significant

differences in ratings were found for any of the questions regarding the focus group and individual interview experience, suggesting that both methods are appropriate for research in children, from the children's perspective.

2.6 Conclusion

It is well established that children know that eating nutritious food and being physically active are important for being healthy. However, such studies have a narrow focus and typically concerned with the role of physical activity rather than food on health. Findings from studies of children with a greater focus on food and health are inconsistent, have been conducted overseas, or in different age groups of children, and as a result, cannot be generalised to New Zealand school children. There is a lack of information about what New Zealand school children know, understand and believe about the effect of food on health. This information would be useful to inform the New Zealand curriculum, but also interventions that may address current health issues in children such as overweight and obesity.

3. Objective Statement

Adequate nutrition during childhood is critical and can have many positive effects for children and their health, which extends beyond physical health. After a comprehensive review of the literature, a number of gaps were identified, and in particular, little is known about the views and beliefs that New Zealand children have about the role of food in health. The aim of this pilot study was to trial methodology to investigate what year 6 children attending primary schools in New Zealand know, understand and believe about the effect of food on health.

The objectives to achieve this aim were to:

1. Review the literature to identify the most appropriate methodology to conduct research in school children
2. Develop questions to ask children to explore their thoughts, understandings and beliefs about the effect of food on health
3. Conduct focus groups in school children to discover what children think about the effect of food on health

4. Subjects and Methods

4.1 Study design

The present study was a pilot study that used qualitative methods to collect data on what children know, understand and believe about food and its effect on health. The study aimed to recruit 60 Year 6 children (9-11 years old) from eight primary schools in West and South Auckland, New Zealand. Discussions were to be undertaken via focus groups consisting of four to eight children held during March 2018. Ethical approval was granted by the University of Otago Human Ethics Committee in November 2017 as a Category A application. (reference number 17/180, Appendix A).

4.2 Participants and recruitment

Co-educational, public schools from both West and South Auckland were selected using the Ministry of Education New Zealand Schools directory (74) with the aim of recruiting a range of low, medium, and high decile schools via purposive sampling (75). A letter of invitation to take part in the study was sent to the school principal (**Figure 1**) (Appendix B). Interested schools received information packs containing Information and Consent forms for parents/guardians and children and these were handed out to all year 6 children (Appendix C-F). Signed consent forms (both parents/guardians and children) were returned to the school. If more than eight children were interested in participating, a second focus group was held at the school. Once participant numbers were confirmed by participating schools, a time was arranged with the school for focus groups to take place (**Figure 1**).

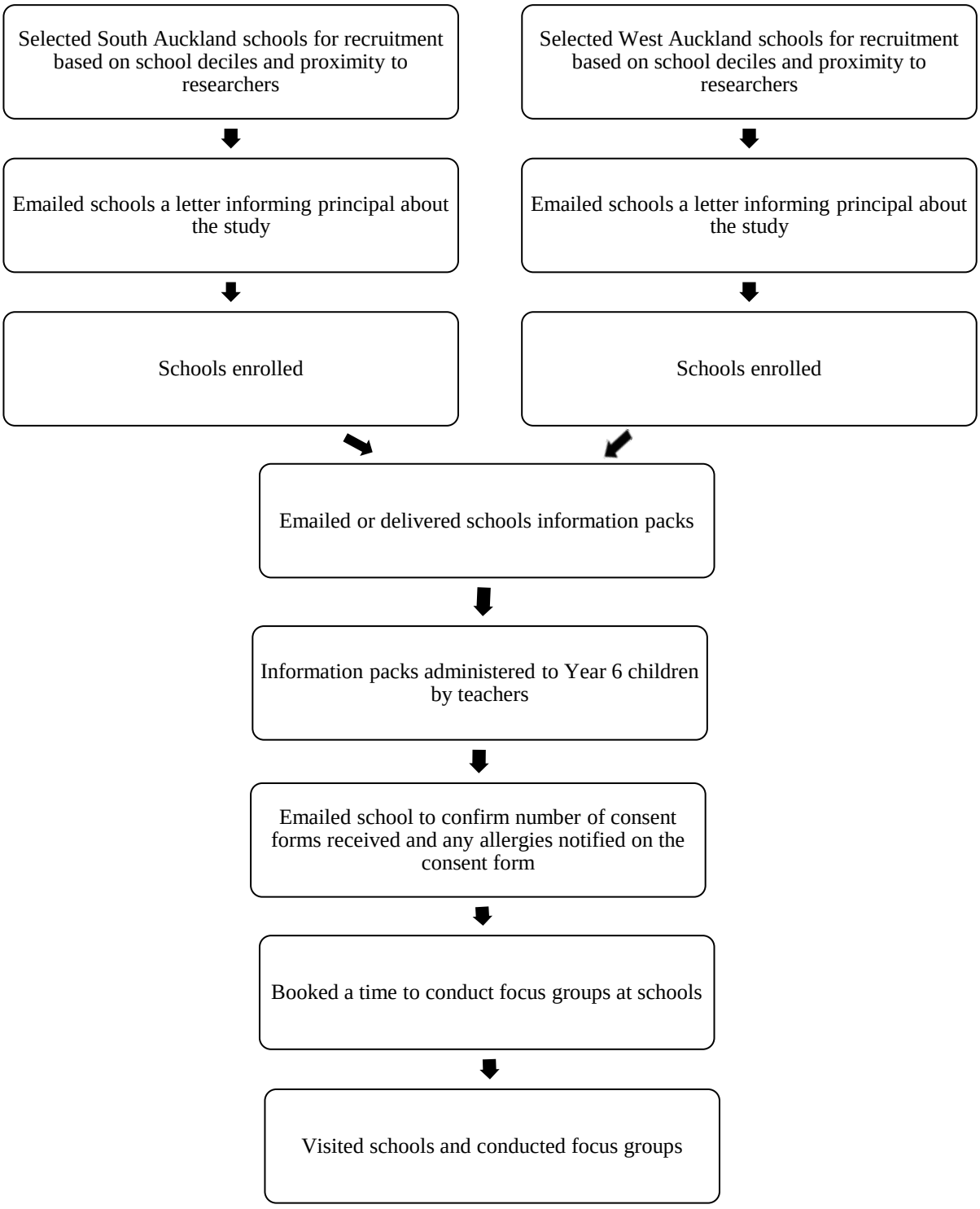

Figure 1. Flow chart for the school recruitment process

4.3 Data collection

4.3.1 Focus groups

Focus groups are an effective way to explore health knowledge in children (66, 72), thus were used in this study. One or two focus groups were conducted at each school depending on the number of participants. All focus groups included both boys and girls and children were often from the same class; the discussions were not considered to be of a sensitive nature that warranted having children in separate groups for boys and girls. The literature recommends that focus groups with children include four to six children, (13, 48, 50, 66, 68-70) however, due to time constraints and some schools having 16 children willing to participate, the number of children in each focus group ranged from four to ten. Ideally a maximum of eight students was required for each focus group, however one focus group contained ten children. This was because children participating were from the same class and it was disruptive for the rest of the class that was not participating to have children taken out for focus groups at two separate times. Children were therefore placed in the same focus group resulting in a larger group size. In larger schools where more than 16 children returned consent forms, 16 children were randomly selected by teachers to take part and two focus groups were conducted with eight children in each. All focus groups took place during school hours and at the school. Depending on resources, focus groups were often conducted in staff rooms, spare classrooms or communal seating areas within the school.

Two-female, student researchers including the candidate (and another Master of Dietetics student) were present for all focus groups. Each researcher was responsible for facilitating focus groups in one Auckland region (i.e. West Auckland or South Auckland) and note taking in the other region. The same script and questions were

used by each facilitator in all focus groups (Appendix I). Both researchers had previous facilitator experience from their undergraduate degree and had been police vetted prior to conducting focus groups. The student researchers introduced themselves as *'health researchers'* instead of dietetics or nutrition students, to acknowledge the concept of *'researcher reflexivity'* where the qualifications of the researchers may bias the children to talk about healthy food (76-78). The student researchers acknowledged the influence of researcher reflexivity throughout the qualitative research process.

4.3.2 Development of questions

Prior to conducting focus groups, both student researchers assessed the literature and identified questions that were relevant to the present study. Following this process, both student researchers contributed ideas and created a list of potential open-ended questions to be asked during focus groups (Appendix H). The original list contained a range of questions focussing on food, healthy food, healthy people and the specific effects of food on health. After consulting with academic supervisors and receiving feedback, the list of questions was further refined with any leading (e.g. What foods help your bones?) and sensitive (e.g. Have you ever missed a meal?) questions omitted (79). This refining process was repeated during weekly meetings with supervisors and researchers until three questions were chosen, as follows: What is health?; What can you do to be healthy?; and, Is food important for health, why or why not? Three questions were chosen as focus groups were only 30 minutes in duration, which allowed sufficient time for children to discuss each question in depth. Questions were asked in the same order, to ensure they progressed from being relatively broad to being more specific (i.e. the role of food in health) (61, 72, 79, 80). All questions were practiced aloud between researchers and tested with family

members of researchers (including a year 6 child) prior to conducting focus groups (80).

4.3.3 Structure of focus groups

Before each focus group started, signed consent forms (from parents/guardians and children) were collected by the researchers. Children were then asked to complete a demographic questionnaire containing questions on name, age, date of birth, school and ethnicity (Appendix G). Children sat in a circle and were asked to introduce themselves, following each researcher's introduction, to build rapport. Before asking the questions, children were informed about the purpose of the research and given an overview of the session plan by the facilitator. Ground rules were then discussed with the children and included; only one person to talk at a time; there are no right or wrong answers; you can disagree with others in the group; and you do not have to answer the questions if you feel uncomfortable. The facilitator asked the children for their permission to start the audio recorder and, if all children agreed, the audio recording device (Philips voice tracer digital recorder 3000) was started. The facilitator then read out each of the three open-ended questions.

The researcher not facilitating the focus group was responsible for starting the audio recorders, taking notes and writing down observations. Children were provided with fruit and snacks during the focus groups. All children received a certificate of participation and a gift bag containing stationery and toys (valued at $5/child) at the end of the discussion as reimbursement for their time.

After researchers left each school, they reflected on the focus group experience and discussed the strengths and weaknesses. Occasionally minor adjustments were made in the way questions were asked but only if the prepared questions were not

stimulating discussion with the children. Additional questions such as: What is health or what is being healthy?; What does being unhealthy mean to you?; or What would happen if you do not eat food?, were asked to clearly communicate the topics to the children whilst ensuring the questions remained similar (80).

4.4 Data analysis

All focus group discussions were transcribed verbatim by researchers. Each researcher transcribed the focus groups when they were the note taker to ensure notes and observations made throughout focus groups were included. Participants were coded with a number throughout the transcription process to ensure information from focus groups remained confidential and anonymous; this information was stored in password protected laptops. Each researcher additionally transcribed one focus group they had facilitated and compared data with the other researcher to cross mark and check for consistency between transcriptions.

4.4.1 Thematic analysis

Considering the qualitative nature of this current study, thematic analysis was used to identify common themes throughout focus groups using Nvivo12 Qualitative Data Analysis Software for Windows (81). General inductive thematic analysis was used by researchers as themes were developed from the data and were not predetermined before analysis began (82, 83). A framework that outlines a step by step process created by Braun and Clarke was used to analyse the data in a logical, unbiased and consistent way (82). The process followed by the candidate is further described below;

Phase 1- Audio recordings were downloaded by the researchers onto their laptops and recordings were listened to and transcribed using Microsoft office word 2016.

Phase 2- Transcriptions were uploaded into Nvivo12 Qualitative Data Analysis Software for Windows (81) and transcripts were read individually by each researcher. A long list of codes was formed from transcriptions by grouping similar quotations together. All information relating to food and health was coded in this phase.

Phase 3- Codes and their supporting quotations were then analysed. The strength of the code was determined by the number of times the code was mentioned by participants and the number of focus groups. From this, a list of potential themes was created by grouping similar codes together. In this phase, a mind map was also created to show how each theme overlapped with another.

Phase 4- Themes were analysed and checked for relevance to the research question (i.e. effect of food on health). Some themes were condensed into other themes and some were removed as they were not relevant to the research question.

Phase 5- Four themes were given names and subthemes were further refined. Names of themes were created to capture the theme in its entirety, including its various sub themes. The most relevant quotations from focus groups were identified to support each theme (Appendix J).

Phase 6- The four major themes were presented in written form with supporting quotations. Information that was frequently mentioned in focus groups and related to health or being healthy was also included.

5. Results

5.1 Participants

Six schools in the Auckland region of New Zealand participated in the study; three schools in West Auckland and three schools in South Auckland. The decile rating of the schools ranged from decile 2 to 8. Of the 76 children registered to take part, two children did not participate in the focus groups; one did not have parental consent, and one was not present on the day focus groups were conducted, resulting in a final sample of 74 children. Five focus groups were conducted in West Auckland and six were conducted in South Auckland.

Demographic data of the participants is shown in **Table 2**. Thirty-nine girls and 35 boys participated with a mean (standard deviation) age of 9.9 (0.3) years. Ethnicity was prioritised as follows; Māori, Pacific, Asian and New Zealand European and Other ethnicity (84). The majority (41%) of the children were New Zealand European and Other ethnicity and 27% of the children identified as Māori.

Table 2: Participant characteristics

Characteristics	West Auckland *n* (%)	South Auckland *n* (%)	All *n* (%)
All participants	35 (47)	39 (53)	74 (100)
Sex			
Boys	15 (43)	20 (51)	35 (47)
Girls	20 (57)	19 (49)	39 (53)
Age (years)			
9	2 (6)	3 (8)	5 (7)
10	33 (94)	35 (90)	68 (92)
11	0	1 (3)	1 (1)
Ethnicity[1]			
Māori	7 (20)	13 (33)	20 (27)
Pacific	12 (34)	2 (5)	14 (19)
Asian[2]	5 (14)	5 (13)	10 (14)
New Zealand European/Other Ethnicity[3]	11 (31)	19 (49)	30 (41)
School Decile[4]			
Low (1-3)	17 (49)	0	17 (23)
Medium (4-7)	18 (51)	16 (41)	34 (46)
High (8-10)	0	23 (59)	23 (31)

[1]Ethnicities prioritised in the order: Māori, Pacific, Asian, New Zealand European/ Other (84)
[2] Asian ethnicity included: Chinese, Japanese, Sri Lankan, Indian, Vietnamese and Thai
[3] Other include: South African and Yemen
[4] School decile categories (85)

5.2 Focus group results

Overall, 11 focus groups were conducted between the 9th and 26th of March 2018. The number of children in each focus group varied from four to ten children. Focus groups were approximately 30 minutes in duration. All focus groups were audio recorded and transcribed by researchers. Transcriptions were then uploaded into Nvivo12 qualitative analysis software (81) and thematic analysis was undertaken. During this process transcripts from focus groups were analysed and categorised into groups relating to health, being healthy and the effect of food on health. Information that related specifically to the effect of food on health was further analysed and four major themes were identified.

The following section reports findings on what the children thought about health and being healthy, to provide context for the next section, which outlines the four major

themes relating to the effect of food on health. Supporting quotations from focus groups are included and have been assigned a participant number to maintain confidentiality.

5.3 Health

The first question asked in focus groups was "What is health?" which aimed to provide insights into what children understood about health. Health was repeatedly described by children to be when you are *"healthy"* or doing healthy behaviours such as exercising and eating healthy food. Additionally, children thought health was when you were free from disease or not sick.

Some children expanded on their perceptions of health and thought that "*maintaining your wellbeing", "feeling good", "being able to do things", "thinking good thoughts", "relaxing"* and *"looking after your body"* were important aspects of health. The importance of socialising, forming healthy friendships and maintaining good relationships with family members was also mentioned. Participants from one focus group mentioned that health was made up of multiple domains and believed that physical, spiritual, emotional and mental health were all important components of health.

> *"We're actually studying four different types of health: physical, mental, spiritual and…"- Participant 57*

> *"… If you're feeling upset or something but you're physically healthy, it will still affect you but in a different way"- Participant 56*

> *"It will affect your mental and emotional health, so you won't feel as well."- Participant 57*

Children thought there was a relationship between health and body weight. Often throughout focus group discussions it was mentioned that health was *"staying skinny"*. Following this, other children would disagree and say that health was not being skinny but not being overweight either. Many children said that it was good for your health to have a bit of "*fat"* on your body, just not too much.

> *"No not skinny, but not big, just normal."- Participant 44*

5.4 Being healthy

When asked "what can you do to be healthy?" children mentioned that the major components of being healthy were doing physical activity and eating a balanced diet. In every focus group, physical activity was mentioned as a key component of staying healthy. All children talked about the variety of activities you can do to stay fit including playing sports, doing exercises, swimming and walking to school. Furthermore, children emphasized the importance of going outdoors and reducing screen time as it is important to be active and not get *"square eyes"* from being on electronic devices all day.

> *"Like you know how you like you you needa keep your body healthy like exercise or something?"-Participant 5*

Children also stated that food was an important part of being healthy. Across all focus groups the concepts of variety and eating a balanced diet were mentioned. Children perceived a balanced diet to be one containing fruits and vegetables (five plus a day), less junk food, less sugary, salty foods, and less processed foods. Children were aware that eating healthy foods was important for health, but they also emphasized the importance of having *"treats"* sometimes as a part of a balanced diet, but these should be limited to a few times a week or as some children suggested, every two

weeks. Some children mentioned that a useful way to help with eating a balanced diet was to start meal planning as this was an effective way to show when you need to eat healthy food and when you can have "*treats"* to ensure you are maintaining a balanced diet and including mostly healthy food into your diet.

> *"Balancing between what you should eat and what's good for you and what's not. And you could still eat treats, but you have to balance them out healthily."-Participant 21*

Children mentioned that a balanced diet was one containing a variety of foods (including different coloured foods) to provide a variety of nutrients. Children also stated that a balanced diet meant not eating too much of one thing, even healthy foods as this will not provide all the nutrients that you need to be healthy.

In all focus groups, protein was mentioned as an important nutrient for a healthy lifestyle. Children referred to "*high protein*" foods and meat as particularly important sources of protein and energy. Children also stated that water was important to provide protein and that *"apples mostly contain protein."* Other nutrients mentioned in focus groups were vitamins, predominantly vitamin C and vitamin D, and iron.

> *"It's, I think health means about the protein." Participant 22*

> *"And if you eat more of those you get more of like, you get more healthy cause of the proteins and the nutritions like X said."- Participant 32*

Sugar was also frequently mentioned. Many children referred to *"good sugars"* and *"bad sugars"* and knew that fruit contained sugar. Children's views on sugar varied from group to group and one child said that fruit has more sugar than vegetables and therefore it is healthier to eat more vegetables than fruit. However, most children

thought you could eat as many fruits as you like each day because fruit contains different sugars and not *"bad"* sugars that they associated with junk food, fizzy drinks and lollies.

> *"Are there good sugars and bad sugars? Like lollies will give you like.. like the bad type of sugar and they will just like not make your body work very well. But some sugar you can get from fruits like just like natural sugars."- Participant 54*

5.5 Summary of findings

The previous section reported findings from the focus group discussions about what the children know about health and being healthy. Children mentioned that health is multi-factorial, and some children were aware of the different domains of health. However, most children thought that to be healthy it was important to be physically active and to eat a balanced diet.

5.6 Major themes: The effects of food on health

The next section focusses specifically on what children know about the effects of food on health. After conducting thematic analysis, four overall themes were generated. These include: Theme 1- growth and development; Theme 2- disease and illness; Theme 3- energy; and Theme 4- learning at school. Themes 1 and 2 have associated subthemes to provide clarity to the overall theme as they contain multiple components.

5.6.1 Theme 1: Growth and Development

5.6.1.1 Sub-theme: Bone health

Children realised that food was important for health because it helped your bones to grow. They suggested that if you did not eat, then your bones may start "*breaking"* or

will *"crack when you walk"* and therefore food was important to make your bones stronger. Additionally, some children realised that to ensure optimal bone health, vitamin D, calcium and protein were important to obtain from food and sunlight (vitamin D).

> *"For vitamins and stuff, otherwise you won't... like your muscles won't develop well. Your teeth won't develop well, your bones won't develop well."- Participant 61*

> *"Um if you don't eat protein and calcium and stuff, um your bones will shrivel up."- Participant 54*

5.6.1.2 Sub- theme: Being strong

Food was frequently associated with making your body stronger. Children mentioned that food can make *"your system"* go stronger, your bones and teeth to become stronger, and allows you to stay strong throughout the day. It was mentioned that eating food helps your muscles grow bigger and stronger and this helps with your overall body strength.

> *"Um, because when we are older um we get strong and healthy if we eat the right um foods"- Participant 43*

5.6.1.3 Sub- theme: Growth

A key subtheme was the concept that food helped you grow. Children often mentioned that food was important to grow bigger and taller and helped their muscles grow. They realised that it was particularly important at their age to grow because when you are older you will not grow as much. Some children also relayed stories that their parents had told them about eating certain foods to make them grow taller.

"So, we need food to grow"- Participant 61

"Yeah at the.. at the youngest age possible is a time to really start eating vegetables and fruit. Because if you eat it in your 30s or 40s you won't.. you won't grow as much."-Participant 53

5.6.2 Theme 2: Disease and illness

5.6.2.1 Sub-theme: Getting sick

A common view of the children was that food can influence your likelihood of getting sick. They explained that food is needed to keep your body going, and without it, you could get sick and need to go to hospital. This subtheme was related to a balanced diet as children thought that a balanced diet was essential in preventing one from getting sick because eating too many unhealthy foods can make you sick but eating too many healthy foods can make you sick as well.

"Um, I think it keeps you to running and like it just like keeps your system healthy and nice, fresh and healthy. So, like usually you don't get sick or anything, you don't get diseases or anything you just fresh and healthy."- Participant 17

The importance of vitamin C was also mentioned regarding disease and illness; children realised that vitamins can come from food as well as supplements. Furthermore, some children explained that when they became sick, they took vitamin C tablets to help them get better. Other children knew vitamins were important but were unsure about what they did that was important or which foods provided them.

"Um, I think it helps with um, like it you know, when you get sick it's like a shield where you don't get sick."-Participant 17

Some children thought that food could affect the functioning of your heart. They thought food could influence blood pressure, heart rate, the *"pumping of the blood"* and that eating too much junk food could result in heart disease or heart attacks. Children also thought food could affect your risk of getting cancer, malnutrition and "*health problems.*"

5.6.2.2 Sub- theme: Diabetes

Diabetes was the most commonly mentioned disease that the children identified as being influenced by diet. Children understood that eating a diet high in sugar, salt or junk food can lead to developing diabetes. Often children talked about family members or people they know with diabetes and how they have reduced their sugar intake because of this.

> *"Um people like it's good to be healthy because you could do a lot more stuff and you basically you don't get diabetes and you don't get all this, cause it's actually pretty sad when you have diabetes and that"- Participant 48*

5.6.3 Theme 3: Energy

Another major theme capturing the relationship between food and health is the concept of food providing energy. Many children stated that food is needed to give you energy throughout the day, and without food you would become weak, lazy and eventually starve. Some children mentioned the importance of food when participating in physical activity and how some foods provide different amounts of energy which is important for performance. Children mentioned that some foods give you a quick *"energy boost"* but often the energy does not last, and some foods such as *"weetbix"* are better at providing longer lasting energy. Children provided

examples of when they had eaten certain foods prior to a sports game or other physical activity to give them more energy to perform.

> *"Um to keep energised you could eat food in the day."-Participant 67*

> *"If we don't eat food then we won't survive. Like you need food for like energy."-Participant 13*

Some children stated that by not eating food, they would not have energy to play during morning tea and lunch breaks and they would not be able to socialise with their friends because of their lack of energy.

One child commented that:

> *"Well fruit and things they give you energy but like less healthier foods give you a lot more… but it's hard to burn off."- Participant 71*

This idea was not frequently mentioned as children mostly thought food gave you energy to do things as opposed to the energy content in terms of kilojoules. Children frequently mentioned that healthy foods such as fruit and vegetables gave you energy and water was important to give you energy. A common idea was that the protein and sugar content in the food was responsible for providing energy. Additionally, one child mentioned that when consuming a vegetarian diet, you will not get as much protein and therefore not as much energy, because you are not eating meat.

5.6.4 Theme 4: Learning at school

Several children in this study stated that food could affect their daily life at school. They thought that by eating food, it helped you concentrate in class, focus more, listen, learn and solve problems. Children believed that food is very important for the

brain because the brain needs the nutrients from food to work and learn; to keep the brain healthy you need to eat food.

> *"Um it's definitely important because we need brain food in order to learn… And we need energy to stay awake to be able to learn"- Participant 50*

> *"Um it does a lot of.. whenever you eat food it's actually good for the brain to like listen, learn and like solve problems"- Participant 52*

Many children stated the relationship between not eating food and falling asleep in class. Children said that if you did not eat food during your school day, you would fall asleep in class, become sleepy or be very tired throughout the day which would affect your focus, concentration and overall learning at school.

> *"So you don't have food for morning tea and lunch and then in the end block you would have like no concentration cause you would be really tired."- Participant 63*

Some children talked about meal times and mentioned that breakfast was the most important meal as it got you through the day. Other children stated that eating enough food at dinner time was important because if you did not eat enough at dinner time then you would wake up during the night feeling hungry. This would disrupt your sleep and make you tired in class the next day, affecting your learning at school.

> *"..And because breakfast is the most important meal of the day… because it starts off your day and you need a good breakfast to be strong through the day."- Participant 41*

6. Discussion

This pilot study suggests that focus groups are a feasible method to ascertain what New Zealand children aged 9-11 years know about the effect of food on health. The study found that children believed that food was important for growth and development, preventing disease and illness, providing energy, and learning at school.

6.1 Health

Across all focus groups the main finding was that children believed that both physical activity and a balanced diet were important to be healthy. This result of focus groups with New Zealand children confirm similar findings reported in an extensive body of existing literature from New Zealand and other countries including Australia and the UK (18, 50, 51, 53, 56-58). It was of interest to note that one focus group mentioned that health was made up of four components; physical, mental, spiritual and emotional health. This multi-dimensional view of health was mentioned in a previous study conducted in 9-10 year-olds in New Zealand last year (16). A multi-dimensional concept of health is currently a focus of the New Zealand Curriculum (86), and considering this, it was surprising that this multi-dimensional view was not more widely expressed across the other focus groups. However, health education is taught differently between schools and this may explain the lack of consistency in this study. Studies conducted in other countries do not report children commenting on elements of health beyond the physical.

6.2 Nutrition and health

Overall four prominent themes were consistently mentioned throughout discussions relating to the effect of food on health. These themes were: growth and development, disease and illness, providing energy, and learning at school.

Children in this study believed that food was important for growth and development. This is an interesting finding as previous research in this area have reported inconsistent views of children about the effect of food on growth. A study conducted in children aged 4-5 years and 10-11 years in the UK found that children from both age groups were aware that food was important for growth (i.e. "*growing up to be strong*") and for muscle development (18) whilst children aged 6-11 years from another study in the UK did not mention this relationship at all (57). Furthermore, in the present study children expanded on this theme of growth and development and stated that food was important for bone development. Children stated that vitamin D and calcium, in particular, were needed for bone health, and that one can obtain vitamin D from the sun and calcium from dairy products. The findings of this study indicate that these New Zealand children have a better level of knowledge about the nutrients that influence bone health compared to previous studies. One explanation for this difference might be that growth and development is a key objective listed in the food and nutrition section of the New Zealand Curriculum (86). Another explanation is that 70% of New Zealand primary schools take part in the Fonterra *'Milk for Schools'* programme that supplies children with a 200ml carton of milk each day, which has resulted in an increased consumption of milk by these children (87, 88). The packaging on these cartons contains a nutritional information panel and '*milk facts*' can be found on the back of the carton, which may promote the health benefits of consuming milk to the children and partially explain the children's knowledge of the nutrients needed for bone health.

Another key theme identified by children in this study was the role of food in preventing illness. A study of children in the USA by Nguyen et al. found that children aged 7 years knew that food can affect illness in terms of *"getting sick"*

although it remained unclear what children meant by *"getting sick"* (15). In the current study, children mentioned the link between unhealthy foods and diseases such as diabetes or heart disease. This link was reported in a previous New Zealand study, with one child mentioning that they had been told not to eat sugar because it might lead to diabetes (16). Another study of 300 children from the UK aged 9-11 years noted that children thought the main effect of eating an unhealthy diet (i.e. too much fat) was its effect on the heart; *"fat which blocks the arteries of the heart"* (48), similar to findings from the current study where children mentioned that food can affect blood flow. Many children in the current study knew someone with diabetes, high blood pressure, or heart disease, which may have increased their awareness that these common diseases can be influenced by diet.

An interesting finding from this study was the different views children had regarding energy. It was evident that children knew that food could give you energy, a finding that has been reported in other studies (57, 59). However, when giving examples of foods that provided energy, children mentioned fruits, vegetables and water. The examples of fruit and water providing energy suggests that most children think about food providing energy in terms of vitality as opposed to the energy content in kilojoules. This misconception of energy was further emphasized in a previous study by Fielden et al. in the UK where a 10-11-year old mentioned that *"vegetables are like an energy maker"* (18). This finding shows the confusion children have regarding energy and where energy comes from with the view that vegetables are important for health. This is an interesting finding and future research should aim to investigate these common misconceptions and where children have learnt these from.

The fourth and final theme that was identified in this study was the importance of food for the brain, and, therefore, the effect food can have on learning at school. A previous New Zealand study in children aged 9-11 years found that children knew that food was important for brain activity, but they could not explain this relationship further (16). Findings from the current study, expand on this previous finding as children were able to provide more specific examples of how food can impact brain activity such as the importance of nutrients to help the brain to "*concentrate, learn, listen and solve problems*", however children did not specify which nutrients had these effects on brain functioning. Furthermore, children in this study made the connection between eating food and being able to stay awake and concentrate in class.

The main differences in the current study compared with previous studies were the misconceptions children had regarding protein and sugar. Protein was mentioned in all focus groups as being very important for health and when children elaborated on this further they explained that protein was important because it gave you energy. When children were further asked to provide examples of foods that were good sources of protein, children suggested meat, apples, water and protein bars. The inclusions of apples and water indicates a similar confusion to that noted by energy containing foods. Previous research done in this area, undertaken in the UK, seven and 12 years ago, respectively, did not report children identifying protein as an important component of the diet (18, 57). The mention of protein bars, in particular, by children in this study suggests they have been exposed to dietary behaviours where a high protein diet is promoted (89). This finding emphasizes how vulnerable children of this age group are to messages about foods and health via food advertisements and how parental behaviours can influence children's knowledge and beliefs about the role of food for health.

Sugar was also mentioned frequently throughout discussions, with children holding conflicting views. Some children believed that fruit contained sugar and therefore you should not eat too much fruit, while other children believed that fruit contained different, and not *"bad"* sugars. The knowledge of children could vary within focus groups for children attending the same school, suggesting that children's knowledge of food and nutrition was influenced by factors beyond the schoolyard. During the focus group discussions, children told stories about friends or family members who had experiences with dieting, no sugar diets, or reduced sugar diets for people with diabetes. These stories highlight the impact that experiences of friends and family have on children, which is important to consider when planning educational strategies for children.

6.3 Feasibility and recommendations for future research

Findings from this pilot study suggest that focus groups are a feasible method to ascertain what year 6 children in New Zealand know about the effect of food on health; the results of this study have contributed to an area of limited literature. Now that we have insight into what New Zealand children think, future research could be undertaken to investigate further the misconceptions children have, particularly regarding energy and protein, and the main sources of these foods in the diet. Furthermore, identifying the main influences in children's lives that cause these misconceptions would be beneficial to help address these misconceptions in the future. This study indicated that children are aware of many of the benefits of eating healthy foods; it would be of interest to determine if nutrition knowledge of New Zealand children is reflected in their dietary habits.

When conducting future research in children aged 9-11 years, a main recommendation from this pilot study would be to ensure focus groups contain four to eight children. Although the study aimed to have focus groups with this number, in reality the number of children ranged from four to ten. Larger groups were more disruptive, and children were more likely to be distracted by other children in the group. Smaller groups provided more opportunities for each child to contribute their ideas, gaining a more in-depth insight into the variety of children's thoughts

A further recommendation would be to add a fourth question to the focus group discussions. Findings from this current study have identified some unexpected misconceptions that the children had regarding energy and protein, and therefore a further question focussing on these and where they learnt these from may be beneficial to gain an insight into these misconceptions. Three questions often took less than 30 minutes for children to discuss so adding a fourth question would not make focus groups too long and burdensome for the children.

6.4 Strengths and limitations

6.4.1 Strengths

The qualitative design of the current study using focus groups, was a strength. Focus groups allowed for researchers to gain an in-depth insight into what children think about food and health in an efficient way. The use of open-ended questions allowed for conversations between children and enabled them to expand on ideas of others or disagree with other children allowing the researchers to gain a better understanding of the similarities and differences in children's knowledge. Another strength of this study was the number and variety of children that took part. Data was collected from children of a range of ethnicities and from schools of high, medium and low deciles in the Auckland region, generating a diverse sample of children.

6.4.2 Limitations

The main limitation of this study, and often a criticism of qualitative studies, is the potential bias introduced by researchers. In the current study, researchers were responsible for designing, facilitating and recording focus groups as well as transcribing and conducting thematic analysis of focus group data. Attempts were made to reduce the impact of the researcher including introducing themselves as *'health researchers'* (i.e. not as dietetic students), cross-marking transcriptions between researchers and creating a focus group script with questions that both researchers followed when facilitating focus groups. Another limitation is that the children were more likely to be interested in this study if they had an interest in food or health.

6.5 Conclusion

The findings from this pilot study make several contributions to the literature. First, it has provided an insight into what 9-11-year old children in New Zealand think about health and being healthy. Secondly, findings have identified what children believe are the most important effects of food on health; growth and development, disease and illness, providing energy, and learning at school. Findings have also highlighted areas of knowledge that are often misunderstood by children and provides a basis for informing future educational activities. In summary, focus groups were a feasible method of data collection to ascertain what children know, understand and believe about the effect of food on health.

7. Application of Research to Dietetic Practice

7.1 Part A

The current study has provided information regarding what year 6 children in New Zealand know, understand and believe about the effects of food on health. These findings will be useful for dietitians working with New Zealand school children as it provides an up-to-date view of what year 6 children know about the role of food for health. This will allow dietitians to design educational strategies in the future that will complement children's current knowledge and additionally focus on areas they are not familiar with. For example, an obvious finding from this study was that children were aware of the importance of fruits and vegetables, a balanced diet and physical activity for being healthy, showing that previous strategies targeting these behaviours have been successful. Educational strategies in the future should place more of an emphasis on areas that children are less familiar with to enhance their knowledge. By focussing on the children's needs, this will ensure that future interventions are *'child centred'* which is an important quality of a competent dietitian.

This study has also identified common misconceptions or misunderstandings about food and health often held by children. This is useful for dietitians to consider when working with children as these misconceptions indicate areas that may need to be more clearly addressed and discussed. This also emphasizes the need for dietitians to ensure children correctly understand information as it can often be misinterpreted.

Additionally, findings from this study highlight how children can be influenced by factors outside of school such as television, family and friends. Dietitians need to take this into consideration as different children will likely have different influences in

their lives that can impact their knowledge, understanding and beliefs regarding food and health.

7.2 Part B

Throughout this thesis journey I have become increasingly aware of the importance of effective communication. I have developed my skills by communicating not only with my fellow student researcher and supervisor but with school principals, teachers and children. For me, learning the importance of communication arose when it was apparent that interaction with one school was not as clear as it should have been, and this resulted in focus groups being less organized and groups contained a different number of children to what we had expected. At the time I did not think that our communication had been ineffective with the school, however looking back it is obvious that the more communication we had with the school prior to visiting, the less stressful and more efficient the focus groups were on the day.

Learning from this experience, I now ensure that I communicate effectively with people throughout all aspects of my life and if I feel that communication has not been effective then I will try to correct this before it negatively impacts a situation. In the future, effective communication will be essential for me, as it is an important quality for all dietitians to have when working with people to ensure efficiency. Therefore, I hope to develop this skill even further in the future.

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9. Appendices

Appendix A: Ethics Approval

Appendix B: Letter to principal

Appendix C: Information sheet for parents/guardians

Appendix D: Consent form for parents/guardians

Appendix E: Information sheet for children

Appendix F: Consent form for children

Appendix G: Demographic questionnaire for children

Appendix H: Development of focus group questions

Appendix I: Focus group script

Appendix J: Supporting quotations for main themes

Appendix A: Ethics Approval

17/180

Academic Services
Manager, Academic Committees, Mr Gary Witte

17 November 2017

Professor M Skeaff
Department of Human Nutrition
Division of Sciences

Dear Professor Skeaff,

I am writing to let you know that, at its recent meeting, the Ethics Committee considered your proposal entitled "**Nutrition and Health: What do Year 6 children know, understand, and believe? A pilot study.**".

As a result of that consideration, the current status of your proposal is:- **Approved**

For your future reference, the Ethics Committee's reference code for this project is:- **17/180**.

The comments and views expressed by the Ethics Committee concerning your proposal are as follows:-

While approving the application, the Committee would be grateful if you would respond to the following:

Focus groups for children

The Committee noted that the Information Sheet for Parents and the Information Sheet for Children indicates a different number of participants for the Focus Groups. Please clarify the number of participants to be included in the focus groups.

Consent Form for Parents/Guardians

Item 3 indicates that data "may" be destroyed at the conclusion of the project. Please could you clarify whether there is an intention to potentially retain the information after the conclusion of the research?

Maori Consultation

This research is of interest to Maori. Please supply the Committee with evidence that consultation is underway with the Ngāi Tahu Research Consultation Committee (Te Komiti Rakahau ki Kāi Tahu). If you wish to discuss this please contact Mark Brunton (479 8738, research.maori@otago.ac.nz) or visit:

http://www.otago.ac.nz/research/maoriconsultation/.

Please provide the Committee with copies of the updated documents, if changes have been necessary.

Approval is for up to three years from the date of this letter. If this project has not been completed within three years from the date of this letter, re-approval must be requested. If the nature, consent, location, procedures or personnel of your approved application change, please advise me in writing.

Upon approval, it is expected that all members of the research team are made aware of what the standard conditions of ethical approval covers. This includes the date ethical approval expires, as well as the process regarding applying for amendments to the research.

The Human Ethics Committee asks for a Final Report to be provided upon completion of the study. The Final Report template can be found on the Human Ethics Web Page

http://www.otago.ac.nz/council/committees/committees/HumanEthicsCommittees.html

Yours sincerely,

Mr Gary Witte
Manager, Academic Committees
Tel: 479 8256
Email: gary.witte@otago.ac.nz

c.c. Professor S Samman Department of Human Nutrition

Appendix B: Letter to principal

«Principal» «Selected_School_Name»

«Date»

Dear «Principal»

We are writing to ask if «Selected_School_Name» would allow us to invite Year 6 students to take part in a focus group assessing children's understanding and beliefs about the influence of food on their health. We hope to recruit at least four boys and four girls from your school. This study has been approved by the University of Otago Human Ethics Committee (No. 17/180).

There has been a lot of research investigating the factors that influence children's knowledge about food and being healthy. However, there is limited research that has looked into what Kiwi children actually know and believe. We think that in order to improve New Zealand children's nutrition understanding, we need to know where the gaps in knowledge are. Therefore, our aim is to conduct focus groups to find out what children know, understand and believe about how food influences our health. The information we gather will be used to improve nutrition education programmes in schools and communities.

In order to do this, we would like to conduct two focus groups in your school. The focus groups may be held during or after school hours, and we would like these focus groups to take place at your school, as it is convenient for parents and is a comfortable and safe environment.

The research is being conducted by two Masters students (Isabel Carlisle and Amy McLachlan) under the supervision of Associate Professor Sheila Skeaff and

Professor Murray Skeaff in the Department of Human Nutrition at the University of Otago.

Participation of your school would involve the following:

- Distributing information packs to all Year 6 students enrolled in 2018. As a token of our appreciation, all children who participate will receive a certificate and a gift pack.
- Allow us to hold two focus groups in an empty space at your school (i.e. class room, library, office, or gym). The focus groups will take children approximately 30 minutes to complete, with some additional time at the start and end for an introduction and some refreshments. Overall each session should not take more than one hour.
- The time that the focus groups take place is optional, and may occur during class, in-between class or outside of school hours.
- The study will not require any additional resources from the school.
- If you agree, we will need you or your secretary to tell us the best time in term one that we could meet with the children who have agreed to take part.

We realise that schools are always busy but ask that you consider allowing children from your school to participate; they enjoy the experience. We will contact you by phone or in person in the next week to see if you and your school will take part, otherwise please feel free to email us.

Yours sincerely

Isabel Carlisle and Amy McLachlan on behalf of the research group: Professor Murray Skeaff and Associate Professor Sheila Skeaff.

Email:

Tel:

Department of Human Nutrition

PO Box 56, Dunedin, New Zealand.

Tel 64 3 479 7959 • Fax 64 3 479 7958

Appendix C: Information sheet for parents/guardians

Reference Number: 17/180

21st February 2018

Food and Health: Year 6 Children

INFORMATION SHEET FOR PARENTS / GUARDIANS

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not your child can participate. If you decide your child can participate, we thank you. If you decide your child cannot take part there will be no disadvantage to your child and we appreciate your considering our request.

What is the Aim of the Project?

Many adults, including parents, teachers, doctors, and scientists, want children to be healthy. Food and nutrition has an important role to play in children's health, but what do children actually know and think about food, nutrition and health? The aim of the project is to have group discussions to find out what children think about food and being healthy. This project is part of the Masters of Dietetics research project for Amy McLachlan and Isabel Carlisle.

What Type of Participants are being sought?

We are looking for Year 6 boys and girls attending primary schools in Auckland. Your child's school has accepted our invitation to participate so we are approaching you to ask if your child would like to be involved. As a token of appreciation, children who take part in the survey will be given a certificate of participation and a small gift pack.

What will Participants be asked to do?

Should you agree, your child will be asked to take part in a group discussion with 3-7 other children from school. The discussion will focus on food and health. The discussion will take place during term one, at a time chosen by your child's school. The group discussion will take about 30 minutes. Two researchers will be present, one leading the group and the other recording.

We will provide fresh fruit at the end of the discussion so **please notify us of any special dietary requirements** for your child on the consent form.

Participation in the project is optional and there is no disadvantage to you or your child if you decide not to take part.

What Data or Information will be Collected and What Use will be Made of it?
The discussions will taped and then typed to give us an idea about the current knowledge of Year 6 school children. Your child's name, age, birthdate, and ethnicity will be collected. Only the researchers involved with this project will have access to your child's information.

Information that can identify your child is confidential and will not be given to anyone unless legally required. Children's names will be replaced by study ID numbers. Information that identifies your child will be kept in a separate, secure location from the discussion results and will only be available to Isabel Carlisle and Amy McLachlan (students undertaking the study) and their supervisors Professor Murray Skeaff and Associate Professor Sheila Skeaff. The data collected will be securely stored in such a way that only those mentioned above will be able to gain access to it. Data obtained as a result of the research will be retained for at least 5 years in secure storage. All personal information including name and birthdate of participants will be destroyed at the completion of the research, even though the data derived from the research will, in most cases, be kept for much longer or possibly indefinitely.

The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve your child's anonymity.

This project involves open questions. The general line of questioning focuses on children's views about food and being healthy. All the questions that will be asked have not been determined in advance, but will depend on the way in which the group discussion develops. The University of Otago Human Ethics Committee is aware of the topics to be explored in the discussion, however they have not been able to review the precise questions that are being used.

In the unlikely event that the line of questioning does develop in such a way that your child feels uncomfortable, they will be reminded of their right to decline to answer any particular question and that they may withdraw from the project at any stage without any disadvantage to themselves of any kind.

Can Participants Change their Mind and Withdraw from the Project?
You may withdraw your child from participation in the project at any time and without any disadvantage to yourself or your child.

What if Participants have any Questions?
If you have any questions about our project, either now or in the future, please feel free to contact either:

Amy McLachlan or Isabel Carlisle and *Professor Murray Skeaff*
Department of Human Nutrition Department of Human Nutrition
Work phone: Work phone: (03) 479 7688
foodandhealthproject@gmail.com murray.skeaff@otago.ac.nz

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph +643 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

Appendix D: Consent form for parents/guardians

FOOD AND HEALTH: YEAR 6 CHILDREN
CONSENT FORM FOR PARENTS/GUARDIANS

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that:

1. My child's participation in the project is entirely voluntary;
2. I am free to withdraw my child from the project at any time without any disadvantage;
3. Personal identifying information [*e.g. name, age, date of birth and ethnicity*] may be destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for at least five years;
4. This project involves an open-questioning technique. The general line of questioning focuses on children's views about food and being healthy. The precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the discussion develops and that in the event that the line of questioning develops in such a way that my child feels uncomfortable he/she may decline to answer any particular question(s) and/or may withdraw from the project without any disadvantage of any kind;
5. My child will receive a certificate and a gift pack for participating. Food will also be provided at the group discussion;
6. The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve my child's anonymity.

I agree for my child to take part in this project.

.....

.....

(Signature of parent/guardian) (Date)

.....

(Name of child)

.....

(Name of person taking consent)

Child's food allergies or

intolerances:.....

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph +643 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

Appendix E: Information sheet for children

FOOD AND HEALTH: YEAR 6 CHILDREN

Information sheet for children

Thank you for showing interest in this study. Please read this sheet carefully before choosing if you want to take part in the study. If you want to take part, we thank you. If you don't want to take part, that is okay.

Why are we doing the study?

A lot of people have been trying to find ways to help children be healthier. They have been coming up with classes, posters and activities that can teach children about food and how important it is. **Now, our research team wants to know what you think about food and being healthy!**

Who can take part in the study?

Your school has been chosen to take part in our study. Your principal has agreed for 8-16 children in Year 6 from your school to be included and we are inviting you to take part.

What will you be asked to do?

While you are at school you will join 3-7 other children from your year to join in with a 30 minute talk. Two researchers will be there to ask you some questions and hear what you all have to say. This talk will be recorded. It is not a test, and there are no right or wrong answers. Your teacher and classmates will not be told what you have said. As a thank you for joining in, you will be offered some snacks and will be given a small gift pack and a certificate.

Can I change my mind if I don't want to take part anymore?

Yes, you can change your mind at any time. You can choose not to answer questions and can leave the discussion at any time if you want.

That is fine, it is your choice. You will not get into trouble if you decide to not take part.

What happens with the information from the questionnaire?

We will keep all the recordings and information we get safe in a computer that needs a password. We will not tell anybody about what you have said and nobody other than the researchers will be able to find them out. The information we find out will help us to improve classes and projects that teach children about food. A bit of what you have said may be written up at the end of the study and might be published, but your name will not be used.

What if I have questions?

If you have any questions about the study, either now or later, you or your parents can contact either:

Isabel Carlisle of the Department of Human Nutrition
Amy McLachlan of the Department of Human Nutrition
foodandhealthproject@gmail.com

Professor Murray Skeaff of the Department of Human Nutrition
(03) 479 7688
murray.skeaff@otago.ac.nz

This study has been approved by the University of Otago Human Ethics

Committee (Ref No:17/180). If you or your parents have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph 03 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

Reference Number *17/180*
21st February 2018

Appendix F: Consent form for children

FOOD AND HEALTH: YEAR 6 CHILDREN
Consent Form for Participants

I have read and understood the information sheet about this study. I have talked about the study with my parents and understand what it is about. Any questions I have about the study have been answered in a way that makes sense.

I know that:

1. Participation in this study is voluntary, which means that I do not have to take part if I don't want to and nothing will happen to me. I can also stop taking part at any time and don't have to give a reason;
2. Anytime I want to stop, that's okay;
3. If I have any worries or other questions, then I can talk about these with the researchers that comes to my school;
4. The researchers will audio record me so that they can remember what I say, but the recording will be erased/deleted after the study has ended.
5. The voice recording with my answers will only be listened to by the researchers and the people they are working with. They will keep whatever I say private;
6. My name and birthdate will only be seen by the researchers and the people they are working with. They will keep this information private;
7. Taking part in this study is private. Results of the study may be written up for the researcher's university work but my name will not be on anything;
8. I will receive a small gift of thanks for helping with this study;

Child:

I _____ (print your full name), agree to take part in this study.

I go to _____ School.

Date: _____ Signature: _____

Appendix G: Demographic questionnaire for children

FOOD AND HEALTH: YEAR 6 CHILDREN

Demographic Questionnaire for Participants

The following questions are all about you. Please ask for help if you have any questions.

1. What is your full name?
   First
   Name:.....

   Last
   Name:.....

2. How old are you today? (Please circle one)
   9 / 10 / 11

3. What is your date of birth?
   Day:..... Month:.....
   Year:.....

4. Are you a boy or a girl? (please circle one)
   Boy / Girl

5. What school do you go to?
   .....
   .....

6. What ethnicity do you identify with? Please tick all of the boxes that apply to you. Please ask if you need help with this question.
   - ❑ New Zealand European
   - ❑ Māori
   - ❑ Samoan
   - ❑ Cook Island Māori
   - ❑ Tongan
   - ❑ Niuean

- ❑ Chinese
- ❑ Indian
- ❑ Other (please write here…….)

Appendix H: Development of focus group questions

Brainstorm 1:

- Is food important? Why?
- What makes some food good for us and others not so good?
- What would you need to do to be healthy?
- What foods help your bones/teeth/heart etc
- What happens if you eat too much food?
- What would happen if people didn't eat food?
- Why don't we always eat healthy food?

Brainstorm 2:

- When you are feeling unwell, what could you do to get better?
- If you didn't have a lot of energy, what would be dome things you could do to feel more energetic?
- Do you play sport? What kind? What do you do to prepare for a game? Why? What do you do after?
- Why do people eat?
- What did *insert cartoon character* do to grow so much?

Brainstorm 3:

- What role does food play in your life?
- What does health mean to you?
- What is being healthy?
- When you think of a healthy person what do they look like, feel like etc?
- What do you do to be healthy?
- Where did you learn that? How did you know that?

Brainstorm 4:

- What do you think health is?
- Have you ever missed a meal? Did that affect your day?
- Do you do anything to prepare for tests?
- How tall do you think you will be as an adult? What could you do to make sure you grow?
- When you feel down, what do you do to feel better?

Decided questions:

- What is health?
- What could you do to be healthy?
- Is food important for health? Why/Why not?

Appendix I: Focus group script

- Check consent forms
- Hand out demographic forms.
- Introduce ourselves
- Icebreaker: name and what you want to do for a job when you are an adult.
- Intro
    - Thank you
    - Chat to help us figure out what children think is healthy
    - 30 mins
    - Ask for permission and start audio recorders
- Anonymity
    - Even though we are recording, only we will know that you took part in this chat
    - No one else will know what you say
- Ground rules
    - The most important rule: Only one person speaks at a time. You may have something very interesting to stay but please wait until no one is talking.
    - There are no right or wrong answers, not a test.
    - You do not have to agree with what other people in the group say, and if you disagree, please say so.
    - If you are uncomfortable with the questions, you don't have to answer the questions and you may leave at any time.
    - QUESTIONS?

What is health?

What could you do to be healthy?

Is food important for health? Why/why not?

- Conclusion:
    - Thank you for joining in with this discussion
    - It has been wonderful to hear all of your opinions
    - If there is anything in this talk that you are unhappy with, please talk to us or to your teacher.
- Gift packs and certificates.

Appendix J: Supporting quotations for main themes

Theme 1: Growth and Development
"Vitamin D mixed with calcium will help your bones go Yeah!"
"Strong"
"Strong bones"
"I thought it helps your bones"
"I mean vitamins they like feel for your body like if you didn't have… if you didn't go outside much and you didn't get that much sunlight, your bones would be very very weak cause calcium um it needs vitamin D and you know ah I think some vitamins… like white blood cells or something"
"If you want to grow super tall, you can eat a bunch of bananas"
"So, we need food to grow"
"For vitamins and stuff, otherwise you won't.. like your muscles won't develop well. Your teeth won't develop well, your bones won't develop well"
"Protein…for your bones so they can't crack when you walk"
"And the things you need to make your bones grow"
"And strong and like fit"
"And you would get really weak and um your bones would start like…breaking and your muscles would go like get diseases and stuff"
"Being strong and eating healthy"
"Because it starts off your day and you need a good breakfast to be strong through the day"
"It helps us grow"
"Um, because when we are older um we get strong and healthy if we eat the right um foods"
"You can grow when you are older you get taller and healthier"
"Helps your bones as well as calcium"
"Helps your bones grow"
"Helps your body develop…and your muscles"
"Helps you get big and strong"
"Cos it gets you nice and strong so when you older you're not just a couch potato sitting on the couch all day and then you have kids and they just copy everything you do because they think you are doing the right thing"
"It's, I think health means about the protein…and it's a way of saying I need this food to make my system go stronger"
"You need to have food to be strong and healthy"
"So, we can grow"
"So, you can grow muscles"
"Um drink milk so your teeth get strong."
"Um it makes you grow and it stops health problems I think"
"Umm because um because it's good for your bones, it's good for your heart"
"It might help pump the blood I don't know?"
"Calcium"
"It makes your bones stronger"
"Because then you can do stuff like be flexible and be strong"
"Um if you don't eat protein and calcium and stuff, um your bones will shrivel up"

"So what most um kids don't realise is that um food like grapes and fruit and vegetables they actually help you but... because it helps you grow but when you grow up... when you're like 30s or 40s um they, they understand it and they actually want to eat more to get healthy but by the time they realise, it's actually too late. And they won't grow" "Like sugar and stuff that will like heal you like just then, but stuff like Weetbix and bread, it will last you the whole day and it will give you the strength you need" "Make you strong" "Strengthen your bones" "It helps us grow"

Theme 2: Disease and Illness
"Ahh healthy means that you don't have like…. healthy is like um good blood flow" "Yeah unhealthy foods, if you eat too many unhealthy foods your blood pressure…and, and other stuff" "Cause if you eat too much salt you get diabetes" "If you eat like junk food then you could get like heart disease or..." "Because if you didn't eat food you'd get skinny and stuff but if you ate heaps of food then you could get sick?" "Like if you eat too much junk food you'll get sick but if you eat like too much healthy food then you could also get sick cause you wouldn't have enough of a balanced diet" "And you would get really weak and um your bones would start like…breaking and your muscles would go like get diseases and stuff" "Because if you don't level it out you could get too much of something….and it might make you more unhealthy and damage something" "You could get sick cause your body needs like… food to keep running" "But like if you don't eat it's not good for you, so you could get sick" "Like there is different types of being sick from not eating so like anorexia, or yeah" "Um, I think it keeps you to running and like it just like keeps your system healthy and nice fresh and healthy. So, like usually you don't get sick or anything, you don't get diseases or anything you just fresh and healthy" "I actually kinda didn't agree with her like she shouldn't like not eat because you like you could get sick from not eating, eating less. And if you have too much sugar then you could have diabetes" "Um some could have vitamin C…um, I think it helps with um, like it you know, when you get sick it's like a shield where you don't get sick" "It gives us um, it keeps us from disease" Facilitator: "yeap, it does, so what kind of disease" "Um cancer" "Don't eat unhealthy food all the time as it makes you sick sometimes" "Some food may sometimes make you get cancer" "Diabetes" "Um it makes you grow and it stops health problems I think" "Um you would have malnutrition"

"But it's also not good if you eat a lot of sugar like lollies, junk food and chocolate, cos you could get... I think it's called diabetes or something?"
"Because um if you don't stay healthy, your body will get like a little diabetes and that and that might give you a lot of junk food during like when you grow up. Like my older sister she always eats junk food"
"…He ate so many hamburgers, he had a heart attack and almost died"
"You can have junk food sometimes but too much of it can possibly kill you"
"Um people like it's good to be healthy because you could do a lot more stuff and you basically you don't get diabetes and you don't get all this, cause it's actually pretty sad when you have diabetes and that"
"You can't do much and then you... then you have to inject stuff and you... and it's just not good"
"Umm because um because it's good for your bones, it's good for your heart"
"It might help pump the blood I don't know?"
"Um help with your strength and some vitamins can help you if you're sick"
"Vitamins are good for your organs"
"Cos you know some people in the future actually regret having so much sugar. Cause my dad has diabetes"
"So, you don't get like sick or diseases"
"So, you don't get sick and you don't go to the hospital"
"You could get diabetes"

Theme 3: Energy

"And also, food has all your vitamins and energy, but if you eat like um the wrong types like unhealthy foods, yeah"
"Energy"
"Um to keep energised you could eat food in the day"
"Having energy"
"Well fruit and things they give you energy but like less healthier foods give you a lot more… but it's hard to burn off"
"Um it gives you energy and it's good for you"
"Gives you energy"
"Energetic"
"It gives you protein and energy"
"It gives you energy"
"Yeah um they also give you energy and yeah"
"You need to eat um lots of water to get energy from the water"
"You could do healthy stuff like to have more energy"
"You get energy from it like if you playing a sport you can have lots of energy in your system"
"If we don't eat food then we won't survive. Like you need food for like energy…you need to have food to be strong and healthy"
"If you didn't have food you would starve…yeah and you wouldn't have lots of energy"
"Food can um give you energy and it can help you produce like more energy"

"So, you have lots of energy"
"You have a lot of sugar then you can have a lot of energy"
"Um you have to eat like… you have to eat meat, because some people that don't eat meat tend to… well like they get all sorts of things… cause um meat has protein even though most people don't like it, so they have to like people who are vegetarian... a lot of them are vegetarian and you have to be on a certain diet that if you're a vegetarian otherwise you don't… otherwise you don't have energy"
"Um you need energy so like you get energy from foods"
"Um well... well it's like when you have like protein bars and you have like protein um milkshake or something, um like it's sometimes it's like it's good for your energy but sometimes you're like it's like… it doesn't go for that long"
"Energy"
"Because basically it can give you a lot of energy and… protein and health"
"Like, it makes us, makes you feel a lot more energized"
Facilitator: "Wouldn't get enough protein. Yeah. What's protein good for?"
"Energy"
"Your muscles"
"Because we need the energy. Otherwise you'll feel lazy all the time"
"Energy"

Theme 4: Learning at school

"To keep focused"
"So you don't have food for morning tea and lunch and then in the end block you would have like no concentration cause you would be really tired"
"So you can concentrate"
"And you don't fall asleep during school"
"It can make you like more awake and be able to walk and like run"
"You'd probably get really tired and tired and tireder and you'd probably start to starve"
"I think eating is really good for you because it helps you learn more because its, some of it is like good for your brain"
"And it's like healthy for your brain"
"It would be hard for us to learn"
"Um it's definitely important because we need brain food in order to learn"
"And we need energy to stay awake to be able to learn"
"Um it does a lot of... whenever you eat food it's actually good for the brain to like listen, learn and like solve problems"
"The food gives your brain nutrients in order to work"
"And you can't power the brain"
"Um, keeping your brain healthy"
"You'll be really really sleepy"